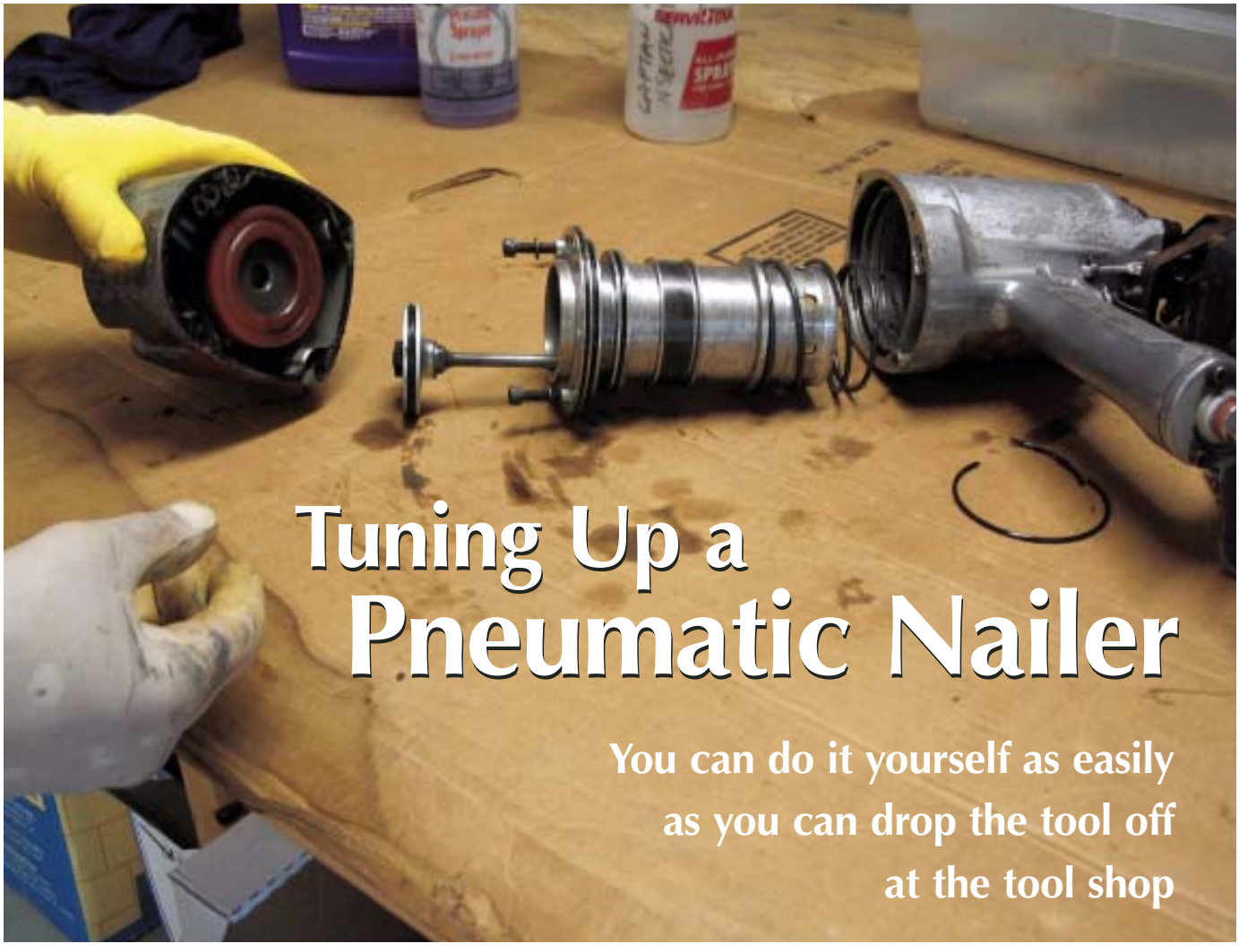

Tuning Up a Pneumatic Nailer

You can do it yourself as easily as you can drop the tool off at the tool shop

by Mike Guertin

When I was 12 years old, my father gave me a Ford straight six-cylinder engine and told me to fix it. I really had no clue what I was doing, but with his tutoring I stripped it down, replaced its worn and broken parts, and put it back together. After 100,000-plus miles, that engine is still going strong under the hood of a '65 Falcon.

So the first time I explored the innards of a pneumatic roofing stapler, I felt right at home: There was a piston, cylinder, rings, intake, exhaust — it was basically a simple motor. Since then, I've been responsible for maintaining and repairing the 30 or so pneumatic tools in my company's arsenal, several of which are themselves antiques. From brad nailers to framing guns, most pneumatic tools are very similar, inside and out.

Regular maintenance, which takes only a few minutes, is an important part of our daily routine. The better we take care of our tools, the less frequently we have to open them up. And when the time comes for a more thorough cleaning and parts replacement, we can do the job on site or in our workshop in 30 minutes or less, which saves us travel time to the tool-repair shop and downtime on the job.

Figure 1. To prevent moisture and debris from getting into pneumatic tools, keep hoses connected to each other when not in use and protect tool fittings with plastic end caps.

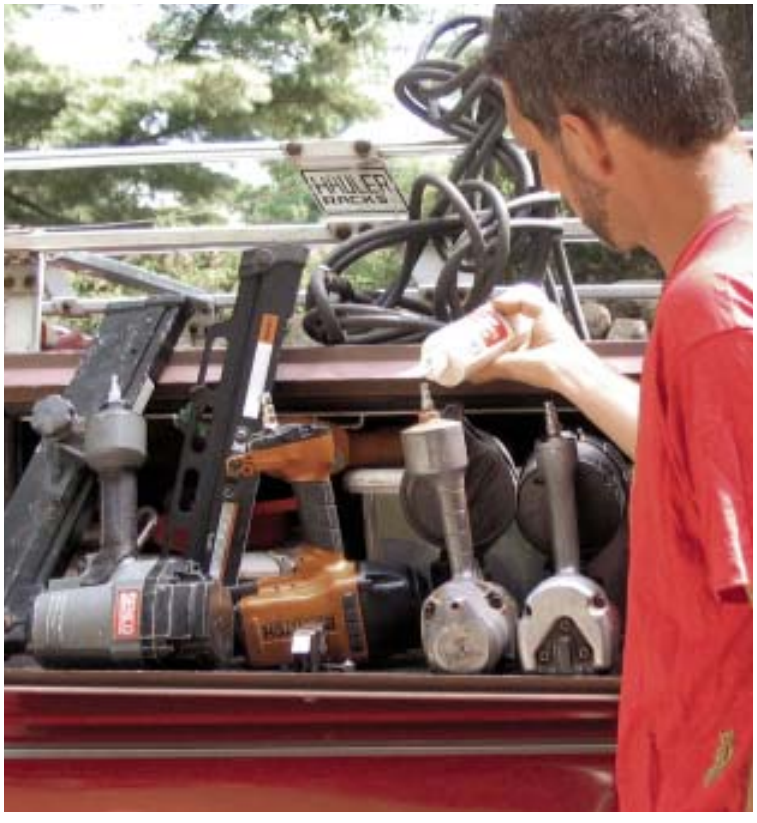

Figure 2. Nailers should be oiled on a daily basis with lubricants designed specifically for pneumatic tools.

Daily Maintenance

It's important to keep the inside of your pneumatic tools clean and lubricated. Cleanliness starts with your air hoses; if they're handled carelessly, uncoupled quick disconnects can fall on the ground. And if dirt and sawdust get in a hose fitting, they'll contaminate your tool the next time you plug it in. Sand and dust quickly wear out the rubber O-rings inside — or, even worse, they can scratch the metal cylinder. Once this happens, power diminishes rapidly.

An easy way to prevent debris from entering hoses is to keep the male and female ends of each hose connected, disengaging them only when you're ready to make a connection to another hose or a tool. Protect a tool's male fittings with plastic end caps. The inexpensive ones designed to cover the cut ends of wire shelving fit pretty well (see Figure 1).

Internal lubrication keeps air tools running smoothly. I have never had good luck with automatic in-line oilers that are connected to the discharge of the compressor. They may work fine on shop compressors, but they don't work as well on mobile compressors, because they tend to snap off and leave the inside of hoses oily. A daily lubrication ritual is just as effective.

When I take tools out in the morning, I drip six to 10 drops of lubricant into the air intake (if the manufacturer has a different recommendation, I'll follow that), using only lubricants formulated for pneumatic tools. Don't use motor oil as a lubricant, because it can deteriorate O-rings and bumpers. On days when I'm driving lots of fasteners, such as during sheathing operations, I'll usually relubricate at lunchtime (Figure 2).

Moisture diminishes the effectiveness of lubricants and can accelerate corrosion of the metal parts inside tools. To help keep moisture out of your pneumatics, drain any water from the compressors daily, and cover the tools in the rain.

Each time you take a tool out to use, look it over carefully for loose or missing screws and parts. Check that the contact tip mechanism is free and not gummed up, and oil it lightly after every couple of uses.

After plugging in the tool, listen for air leaks. Leaks around gaskets may indicate loose screws or a damaged gasket, while leaks around the trigger may signal a malfunction that can compromise safety. Leaks from the exhaust port or the nose of the tool may be a symptom of worn O-rings inside.

With the tool connected, look for cracks or small holes in the housing. Cracks usually are caused by dropping the tool, but small holes can develop on old tools worn from rough use.

Figure 3. An air tool with a cracked body is potentially dangerous because it can blow apart. It should be removed from service.

Figure 4. To check a nailer's driver without disassembling the tool, dry-fire it (with fasteners removed) while keeping the trigger depressed.

Cracks and holes are serious — a cracked housing can explode and send fragments flying — and can't be repaired. If you find a crack or a hole, take the tool out of service but save it for parts (Figure 3).

Disassembly and Cleaning

Periodically, pneumatic tools need to be disassembled and cleaned, and their worn parts replaced. According to at least one manufacturer's guide, this is a chore that should be done on a weekly basis, but I doubt this ever happens in the real world. My framing nailers are used every day, and I disassemble them every one to two months. I open up my finish nailers once a year, but they get used only four days each month. I overlooked a siding stapler for five years until the piston started sticking, but I don't recommend waiting until that happens.

Check the manual first. Before opening up a tool's motor, it's a good idea to make an assessment of what parts will need replacement and round them up ahead of time. I start with the owner's manual; most have exploded drawings of the tool. That the piston O-ring will need to be replaced is a given. Most other O-rings are stationary and will need replacement only if you damage them while disassembling or reassembling the tool.

Though made of hardened steel, the business end of a driver can still show signs of wear. You can check the condition of the driver before disassembling the tool by dry-firing it. First, empty out the fasteners. Hold back the contact safety nose while aiming the tool away from you (and others), and then squeeze and hold the trigger (Figure 4). The tool will fire and the end of the driver will stick out the nose. Worn drivers will have rounded or chipped edges that can lead to jams or unset fasteners.

The bumper also may need replacement, but most of the new ones are more durable than those used 10 or 15 years ago. I wait until after I've opened up the tool to run out — if necessary — and pick up a new bumper from my local tool shop. Its service department stocks such common replacement parts as O-rings, bumpers, gaskets, and drivers for most nailers and staplers. Other parts that don't break often, like cylinders, nail magazines, and caps, will likely involve special orders. Some manufacturers bundle parts into "rebuild kits" that include several O-rings and perhaps a driver. But if the only part your tool needs is a piston O-ring, these kits aren't very cost-effective.

Some disassembly required. I work on a large, clean piece of cardboard that gives me space to spread out parts; when I'm done I can throw the mess away. With the diagram nearby for reference, I start taking the tool apart by removing the cap screws. Some tools

Figure 5. After carefully removing the cap screws (left), the author takes off the cap to expose the cylinder and piston inside (below). Working on a large piece of clean cardboard makes it easy to keep track of parts and to clean up afterward.

have spring-valve assemblies under compression beneath the cap, so I back the screws out evenly to avoid jamming (Figure 5).

Sometimes the cylinder and piston are beneath metal or plastic disks that snap into place, but usually the cap is all that needs to be removed to see these parts. When there's a nut on top of the piston, I use a pair of needle-nose pliers to grip it and pull the piston out (Figure 6). If the top of the piston is flat, I insert a thin metal rod up the nose to push the driver and piston out.

Because air flows between the cylinder and the body, a lot of dirt collects there. So, for a complete cleaning, I remove the cylinder in addition to the piston. Cylinders are held in place with two or three O-rings between the base or sides of the cylinder and the body of the tool, and they snap in tightly; getting them in and out takes some effort.

The new biodegradable degreasers used in the automotive industry work great for cleaning the gunk off pneumatic tools. I fill one spray bottle with full-strength degreaser and another with fresh water for rinsing. To contain the fluids, I work over a large plastic tub while spraying the inside and outside of the tool with degreaser. The degreaser can burn skin, so I wear plastic gloves as a precaution. I wear eye protection, too.

The inside of the tool usually cleans with just a spray and rinse, but tools

Figure 6. Some pistons have a nut on the top that can be grasped with a pair of needle-nose pliers, making it easier to pull the piston out of the cylinder.

Figure 7. A biodegradable automotive degreaser is an effective cleaner, and can be sprayed on both the exterior and interior of the tool (top left). Most tools can simply be rinsed with water afterward (top right). A toothbrush is perfect for removing stubborn dirt (above left). Two cylinders — one clean and one dirty — demonstrate the importance of regular cleaning (above right).

that haven't been cleaned regularly require a little elbow grease to remove thick gunk. The outside often has caked-on grease that also needs scrubbing to remove. I save old toothbrushes for just this purpose. After a couple of sprays, some brushing, and a rinse, the tools look like new (Figure 7).

Inspect and replace as necessary. The bumper sits at the bottom of the cylinder. Made of rubber or plastic, it stops the downward motion of the driver piston. When bumpers become worn, the driver may overdrive fasteners or may not return to the top of the cylinder. A bumper needs replacing only when it hardens and starts to chip. To see if it's still resilient, I poke it with a screwdriver. For closer inspection and possible replacement, I use long needle-nose pliers to grab and pull out suspect bumpers. When a bumper hasn't been replaced in a while, I go ahead and put on a new one when I replace a worn driver. That way, I ensure I won't have to do a major overhaul for a while.

Replacing the driver is the only operation where I find it necessary to be in a shop equipped with a bench-mounted vise. Drivers are connected to pistons in several ways: They can be threaded, bolted, or pinned. To disconnect the two parts, I clamp the driver (or extended portion of a piston) in the vise. When I'm reinstalling either a threaded driver or a bolt-on driver, I coat the threads with thread-locking compound. This keeps the driver or nut from accidentally unscrewing during use (Figure 8, page 7).

Before putting the nailer back together, I visually check the lining of the cylinder for deep scratches. Tiny scratches aren't a problem, but deep ones can cause O-rings to wear quickly. The only times I've had deep scratches on a cylinder were when a driver broke inside and jammed the piston. On those tools, I replaced the cylinder, piston, and driver all at once. I've never had success honing out deep scratches.

Fitting the Pieces Back Together

Before reassembling the tool, I wipe the inside dry with paper towels or a clean cloth, then spread a thin film of pneumatic lubricating oil inside the

Touching Up the Tip of a Driver

My coil roofing nailer was long overdue for an overhaul, and I noticed that the end of the driver was rounding over. But I balked at the $120 price for a new driver, figuring I could buy a new nailer for under $300. So I decided to try grinding the face of the old driver to give it a few more years of life before replacing it.

The easiest way to touch up the face of a driver is on a grinding wheel. But since I don't have one, I put a fine belt in my belt sander instead and clamped the sander in a vise. When I put the face of the driver against the belt, I didn't try to take out all the imperfections; that would wear off too much metal. Just a few light presses against the sander were enough to flatten the face sufficiently. Limiting the grind time to 10 seconds and dipping the driver tip into cold water prevented the steel from losing its temper.

The driver on my 15- to 16-gauge finish nailer wears quickly. So even though it costs only $10 to replace, I'll occasionally touch up the tip without even taking the tool apart. First, I remove the nails and connect the air. Then, holding back the contact trip nose, I fire the tool and keep the trigger depressed. This exposes enough of the driver tip that I can give it a quick touch-up grind on my belt sander.

Instead of being smooth and flat, this driver tip is chipped and worn (inset), causing jams and unset fasteners. To touch it up, the author clamps a belt sander in a vise (a grinding wheel could also be used) and lightly sands the tip with a fine-grit belt until the driver is flat again.

cylinder with my finger. (Spray oils are usually too thin and can attack and deteriorate the O-rings.) I pop the new piston O-ring into its groove dry, and then coat it with oil. The trick to reinserting the piston into the cylinder is aligning the driver with its slot or hole. You can't see either the hole or the driver once you place the piston over the cylinder, so it usually takes five or 10 minutes of fumbling before the driver pops into place. To prevent the top edge of the cylinder from gouging the new O-ring, I carefully ease the O-ring into place by working my fingers around it as I press down on the piston. Finally, I push the piston all the way down to the base to make sure it moves freely, then drip five more drops of oil on top before closing up the tool (Figure 9, next page).

Before mating the cap back on top, I check the gasket or rubber ring. Gaskets can usually be reused, but sometimes they'll stick to both halves of the tool during disassembly and need to be replaced. In that case, I use a fresh razor blade to scrape off the old gasket material. Rather than running back to the repair shop when a gasket tears, I keep a sheet of thin gasket material (available at automotive-parts stores) in my shop and cut a new one. If the old gasket is relatively intact, I use it as a template. If not, I apply a thin coat of oil to the tool's cap and press it onto the gasket material, marking the inside and outside edges of the cap. This makes it easy to trim the new gasket to size.

If the cap is spring-loaded, I'm careful to torque down the screws evenly. And I make sure that the cap seats

Figure 8. The author uses a thread-locking compound when reassembling a piston and its threaded or bolt-on driver.

Figure 9. Before inserting the piston into the cylinder, the author spreads a thin coat of lubricant on the interior of the cylinder and on the piston's new O-ring (left). After aligning the driver with its slot inside the piston (right), he eases the piston back into the cylinder, taking care not to damage the O-ring.

down evenly to the cylinder as I bring the two together.

Before test-firing the tool, I make one last overall inspection. I check all screws to make sure they're tight, operate the contact trip nose to see that the spring and the trigger mechanism are moving freely, and check that the magazine is functioning properly. Sometimes when I put things back together, I misalign something and parts jam. A good look-over usually catches any problems.

Since air flows through the trigger valve, I deposit a little oil inside it during the regular daily oiling process. But when trigger valves start leaking air, they need replacing. This is a procedure that I hand off to my repair shop.

Also, coil nailers have a second, much smaller piston system that advances the nails into the firing chamber. I don't find that this mechanism needs regular servicing, but I do check and oil it during the final inspection. First, I remove any nails and open the loading door to get a clear view of the advancing pawls, and then I connect the air and dry-fire the tool. The pawls should move back and forth easily during the firing cycle. Next, I drip oil onto the piston connecting the rod and the pawls (this is also part of my daily oiling routine).

When I do notice a problem with the advancing system, I drop the tool off for service. There are far too many tiny parts and springs in this system, and I would rather let someone else mess with them.

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